UCRL-JC-124289 Abs Rev 1

38th Annual Meeting, APS Division of Plasma Physics
11-15 November 1996, Denver, CO

ABSTRACT SUBMITTAL FORM

Deadline: Wednesday, 10 July 1996

Subject Classification Category 4.93 ☒ Theory ☐ Experiment

*** Laser Cooling for Heavy-Ion Fusion (HIF)** D. Ho, S. Brandon, and Y. Lee, LLNL. A critical requirement for HIF is the ability to focus space-charge dominated beams onto a millimeter-size spot. However, chromatic aberration can result in a substantial fraction of the beam ions falling outside the spot radius. Because of the space-charge force, correcting the chromatic aberration using sextupoles is impractical. Success in laser cooling of low-current ion beams in storage rings leads us to explore the application of laser cooling to HIF. Basic scheme: After the beams have been accelerated to the desired energy by the recirculating induction linac, we let the beams coast around at constant energy. For efficient interaction between the laser and the beam ions, we use Ba^+ beams. We use two lasers to pump the transitions in the Ba^+ for generating the laser force F_L. There is also an auxiliary force F_a, which is in the opposition direction of F_L, provided by the induction cores. The momentum spread along the beam can be compressed by F_L and F_a. We will present preliminary PIC simulations using the PIC code CONDOR. Potential difficulties caused by velocity space instabilities will be discussed.

*Work performed under the auspices of the U.S. DOE by the LLNL under Contract W-7405-ENG-48.

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_____
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Tom Dittrich
Member Name Typewritten

Lawrence Livermore Nat'l. Lab.
Affiliation

(510) 423-97861 / (510) 423-9208
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_____
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